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MEMORIAL OF WILLIAM LAWRENCE UGLOW

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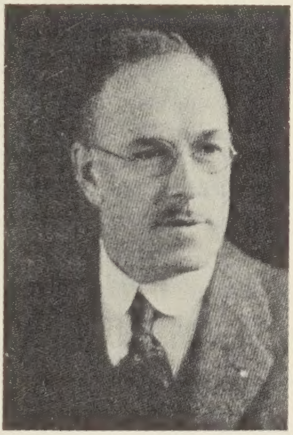
William Lawrence Uglow was born in Ottawa, Canada, April 29th, 1884. His father, Richard Uglow, was of Cornish birth and his mother, Georgia Robertson, was a native of Ottawa. The children were William Lawrence, Harry, Helena and Marjorie.

While the family was still young, Mr. Uglow moved to Kingston, Ontario, where he established a book and stationery store, patronized for many years by the students of Queen's University and still carried on by the Uglow Estate. Through the close personal contacts established in his business, Mr. Uglow was ever familiarly known by students and faculty of Queen's University, and as his sons grew up they cemented the relationship.


WILLIAM LAWRENCE UGLOW
1884-1926

"Laurie," as he was known to his associates, graduated from the Kingston Collegiate Institute and entered Queen's University in the autumn of 1901. He was granted his B.A. degree with honors in Political Economy and English in the spring of 1905 and in the spring of 1906 he took his M.A. in the same honor course, winning medals in both English and Political Economy. His natural love of the English language, and especially of its verse, grew with the years, and was a controlling influence in his life.

Uglow spent the summer of 1903 as an assistant on a field party of the Geological Survey of Canada and from 1906 to 1907 he was engaged as rodman on railway surveys. In the autumn of 1907 he again entered Queen's, this time as a student in the School of

Mines from which he graduated with the degree of B. Sc. in Mining Engineering in the spring of 1911. The summers of '09, '10, '11, respectively, were spent with the Geological Survey of Canada at Bathurst, N. B.; with the Ontario Bureau of Mines on its original Porcupine survey; and with the late Dr. A. E. Barlow prospecting in northern Ontario and Quebec.

In the autumn of 1911, Uglow again entered college halls, this time at the University of Wisconsin, where he became a candidate for the degree of Doctor of Philosophy in Geology; this he was granted in the spring of 1914, having taken the degree of M.Sc. in 1912. With the attainment of five degrees in course, Dr. Uglow's formal studies were concluded, but this was only the beginning of years of independent study and research, as his publications show.

During the summer of 1912, Uglow studied the geology along the Canadian Northern Railway between Port Arthur and Winnipeg for the Canadian Geological Survey and reported on his work in the Guide Books of the 12th International Geological Congress. He also acted as guide over this area for Congress excursions in 1913. In the winter of 1913–14 he was employed as "mine valuation engineer" by the Wisconsin Geological Survey. From this employment he transferred to the Vinegar Hill Zinc Co. for which he acted as Mining Geologist until the autumn of 1915, when he joined the staff of the University of Minnesota as instructor. In 1916 he joined the staff of the Cerro de Pasco Copper Corporation as Mining Geologist and did work for them in Peru. In June 1916 his brother Harry was killed in action at Ypres, and resigning his position in South America, Uglow returned to Canada to enlist in the expeditionary forces. Failing to pass the medical examination, he applied for war-work and became a field engineer on the Canadian Munition Resources Commission, spending the summer of 1917 in New Brunswick. On December 31st, 1917, he married Miss Mattie B. Robertson of Peterboro, Ontario, and they resided in Ottawa until May 1918. He was employed during the summer and autumn of 1918 by the Munition Resources Commission to search for platinum in Alberta and British Columbia.

With the close of the War, Uglow joined the staff of the University of British Columbia as Assistant Professor of Geology. In 1921 he was promoted to Associate Professor of Mineralogy and Petrography and in 1922 he was appointed Professor of Mineralogy and Petrography. This position he held at the time of his death.

While on the staff of the University of British Columbia, his summers were divided about equally between consulting work and field work for the Geological Survey of Canada. During the summer of 1925; he spent several weeks visiting his mother and sisters at the family home in Kingston. In October 1925, he obtained leave of absence from his University duties to proceed with the geological survey of the Colony of Hong Kong, which had been carried on for two years under the direction of Dr. R. W. Brock, Dean of the Faculty of Applied Science of the University of British Columbia.

A short time before Uglow arrived in Hong Kong, a serious landslide, following a torrential rain, destroyed much life and property in Victoria, the capital city of the colony, and his first duty was to report on the condition of other parts of the "Peak" on the face of which the city is built. This he did to the satisfaction of the Colonial officials. Much of the remainder of his time was spent surveying Lan Tau island, a part of British leased territory, which is considerably larger than Hong Kong island. This special work was done from the Governor's yacht "Stanley."

With the commencement of the rainy season, Professor Uglow left Hong Kong, and returning by Japan, met his wife and little daughter Elizabeth at Honolulu, where it was intended to pass a short holiday. While enjoying to the full the reunion with his family, he met the accident which proved fatal.

On May 14th, the second day after the arrival of Mrs. Uglow and "Beth," all three were enjoying surf bathing on Waikiki beach near "Gray's-by-the-Sea." Going back for one more plunge through the surf, he in some manner struck his head on the bottom and dislocated a vertebra in his neck.

After weeks of medical care at Queen's Hospital, Honolulu, he was brought home to Vancouver, landing July 23rd. The trip was a most trying one for all concerned, but the few days at home, and the meeting with his mother and sisters, gave Professor Uglow so much pleasure that the trials and risk of the return were fully justified. He passed peacefully away on August 3rd 1926.

Many honors were conferred upon Professor Uglow. While at the University of Wisconsin, he was elected a member of the honorary scientific society of Sigma Xi; in 1922 he was elected a Fellow of the Geological Society of America and the Mineralogical Society of America; and in May, 1925 he was elected a Fellow of the Royal Society of Canada. For many years a member of the Canadian Institute of Mining and Metallurgy, he was elected chairman of the Vancouver branch in 1924. He established the night classes in geology at the B. C. Chamber of Mines and taught them for three years. His work was much appreciated by the prospectors and others who took the courses, and in recognition of his services he was elected Vice-President of the Chamber of Mines, holding this position at the time of his death. In September, 1920, he joined the Association of Professional Engineers of British Columbia, acting on various committees until 1924 when he was elected a Member of the Council. He was a member of the Kiwanis Club and a charter member of the Quilchena Golf Club of Vancouver.

Doctor Uglow was a man of broad outlook, sound judgment and strong, cheerful character. As a consulting mining geologist, he enjoyed the confidence of governments and the public alike. Fearless in his convictions, yet cool in argument, he disarmed his opponents before they could feel enmity. He was an inspiring teacher of mineralogy and petrography, stimulating many students to take post-graduate work along these lines of science. His field work and research were, however, much broader than the limitations of his chair. Still broader than his scientific interests were his sympathies and his general activities.

Mrs. Uglow and six year old Elizabeth, his mother and sisters mourn the loss of husband, father, son and brother. The staff of the University of British Columbia and the large number of students who have taken his courses mourn the loss of a beloved associate and teacher. The prospector and mining investor mourn the loss of a faithful advisor and friend. The geological and mining fraternity of America has suffered by the passing of a brilliant and productive scientist in the prime of his career.

As already stated, government bureaus of three separate countries sought Dr. Uglow's services. While his work was mainly of an economic nature and applied to metalliferous deposits, the thirty-seven titles of his bibliography include economic reports on coal, philosophical papers on ore occurrence and ore possibilities, discussions on physiography and earth movements and mineralogical descriptions. His paper on "Undiscovered Mines of British Columbia" won the Leonard gold medal from the Canadian Institute of Mining and Metallurgy in 1923. Even as this paper is being prepared, Memoir 149 of the Geological Survey of Canada has just come from the press and an additional paper of which Doctor Uglow is joint author is to follow. The result of his work in Hong Kong will be embodied in the general report of the Survey of the Colony.

BIBLIOGRAPHY

1911 The Alexo nickel deposit. *Ont. Bur. of Mines, Ann. Rept.*, vol. **20**, pt. 2, pp. 34–39, 6 figs., 1911.

1912. The Alexo mine: A new nickel occurrence in Northern Ontario. *Jour. Can. Min. Inst.*, vol. 14, pp. 657–677, 5 pls., 4 figs., 1912.

1913. Discussion of paper by E. S. Moore on "Hydrothermal alteration of granite and the source of vein-quartz at the St. Anthony mine." *Econ. Geol.*, vol. **8**, No. 8, pp. 797–800, December, 1913.

Port Arthur to Winnipeg via Canadian Northern railway. *Geol. Surv., Dept. of Mines, Ottawa. International Geol. Cong. Guide Book*, No. **8**, pp. 37–69, 1913.

A review of the existing hypotheses on the origin of the secondary silicate zones at the contacts of intrusives with limestones. *Econ. Geol.*, vol. **8**, No. 1, pp. 19–50, January; No. 3, pp. 215–234, 2 figs., April-May, 1913.

1914. "Secondary silicate zones": A reply to criticisms by J. F. Kemp and C. A. Stewart. *Econ. Geol.*, vol. **9**, No. 2, pp. 175–183, March, 1914.

1916. Lead and zinc deposits in Ontario and in eastern Canada. *Ont. Bureau of Mines, Ann. Rept.*, vol. **25**, part 2, 56 pp., 3 figs., 2 maps, 1916.

Origin of certain ore-deposits. *Econ. Geol.*, vol. **11**, No. 1, pp. 87–92, January' 1916.

Ore genesis and contact metamorphism at the Long Lake zinc mine, Ontario. *Econ. Geol.*, vol. **11**, No. 3, pp. 231–245, 1 pl., 1 fig., April-May, 1916.

1917. Gneissic galena ore from the Slocan district, British Columbia. *Econ. Geol.*, vol. **12**, No. 8, pp. 643–662, 4 pls., 5 figs., Dec., 1917.

1919. Geology of platinum deposits. *Eng. and Min. Jour.*, vol. **108**, No. 9, pp. 352–355, August 30; No. 10, pp. 390–392, September 6, 1919.

1920. Bog manganese deposits, Upper North Branch, Canaan river, Westmorland county, New Brunswick. *Canada Munition Resources Commission, Final Rept.*, pp. 65–79, 2 pls., 1 fig., 1920.

1920. Bog manganese deposits, Dawson Settlement, Albert county, N. B. *Canada Munition Resources Commission, Final Rept.*, pp. 79–88, 4 pls., 1920.

Manganese mines, Colchester county, Nova Scotia. *Canada Munition Resources Commission, Final Rept.*, pp. 88–89, 1920.

An investigation of an alleged occurrence of platinum on Peace River, B. C. *Canada Munition Resources Commission, Final Rept.*, pp. 156–160, 1920.

Douglas gold-platinum gravels, North Saskatchewan river, Alberta. *Canada Munitions Resources Commission, Final Rept.*, pp. 185–194, 6 pls., **1920.**

Possibilities of platinum in western Canada. *Min. and Eng. Record*, vol. **24,** Nos. 23–24, pp. 410–413, December 30, 1919.

Possibilities for platinum in western Canada. *Bull. Can. Min. Inst.*, No. **95,** pp. 207–220, March, 1920.

1921. Possibilities for platinum in western Canada. *Trans. Can. Min. Inst.*, vol. **23**, pp. 374–389.

An Unusual Copper-Lead Deposit, Legate Creek, B. C. *Min. and Scien. Press*, vol. **123,** No. 6, pp. 197–199, 4 figs., August 6th, 1921.

1922. Quartz veins of Barkerville, Cariboo district, B. C. *Bull. Can. Inst. of Min. and Met.*, No. **127,** pp. 1165–1175, November, 1922.

Geology of the North Thompson valley map-area, B. C. *Canada Dept. of Mines, Geol. Surv., Summ. Rept.*, **1921,** Part A, pp. 72–106, 2 pls., 12 figs., 1 map, **1922.**

The Eocene Coal basin at Chu Chua, B. C. *Bull. Can. Inst. Min. and Met.*, **124,** pp. 896–902, 906–907, August, 1922.

A so-called bornite-chalcopyrite intergrowth. *Am. Mineral.*, vol. **7,** No. 1, pp. 1–4, 4 figs., January, 1922.

1923. Cretaceous age and early Eocene uplift of a peneplain in southern British Columbia. *Bull. Geol. Soc. Am.*, Vol. **34,** No. 3, pp. 561–572, 4 figs., September, 1923.

Bedrocks and quartz veins of Barkerville map-area, Cariboo district, B. C. *Canada Dept. of Mines, Geol. Surv., Summ. Rept.*, **1922**, part A, pp. 82–97, **1923.**

Undiscovered mines of British Columbia. *Bull. Can. Inst. of Min. and Met.*, No. **138,** pp. 595–613, October, 1923.

Discussion of a paper by George Hanson entitled "The Dolly Varden mine." *Can. Inst. of Min. and Met., and of Min. Soc. of N. S., Trans.*, vol. **25,** p. 224, 1922.

The Eocene coal basin at Chu Chua, B. C. *Can. Inst. of Min. and Met., and of Min. Soc. of N. S., Trans.*, vol. **25,** pp. 370–376, 1922.

Quartz veins of Barkerville, Cariboo district, B. C. *Can. Inst. of Min. and Met., and of Min. Soc. of N. S., Trans.*, vol. **25,** pp. 152–162, 1922.

Uglow, W. L. and Johnston, W. A. Origin of the placer gold of the Barkerville area, Cariboo district, British Columbia, Canada. *Econ. Geology*, vol. **18,** No. 6, pp. 541–561, 3 figs., September, 1923.

Nichols, H. G. and Uglow, W. L. British Columbia as a mining province. *Min. Mag.*, Vol. **29,** No. 2, pp. 73–81, 1 fig., August, 1923.

Undiscovered mines of British Columbia. *Can. Inst. of Min. and Met., and of Min. Soc. of N. S., Trans.*, vol. **26,** pp. 300–318, 1923.

1924. Ore problems and the microscope. *Can. Inst. of Min. and Met., Bull.* No. **147**, pp. 495–504, July, 1924.

The Windpass gold mine, Chu Chua, B. C. *Can. Min. Jour.*, vol. **45**, No. 2, pp. 47–49, 4 figs., Jan. 11, 1924.

1926. Johnston, W. A. and Uglow, W. L. Placer and vein gold deposits of Barkerville, B. C. *Memoir* **149**, *Can. Geol. Surv.*

Young, G. A. and Uglow, W. L. The iron ores of Canada. Vol. **1**. British Columbia and Yukon. *Geol. Surv. Can., Economic Geol. Series*, No. 3.

THE SCIENTIFIC VALUATION OF MINERALS

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The science of mineralogy would be distinctly benefited by the adoption of scientific methods in the valuation of minerals. It would aid in preventing the pricing of minerals higher than is justified by the advance in general commodity prices since 1914. Lower prices would become popular and these would lead to a wider distribution of minerals and to the acquisition of more specimens by collectors and museums. While it is not likely that any scheme for the scientific valuation of minerals heretofore found would meet with general acceptance, the members of this Society could do much towards standardizing the methods of valuation of new finds which they make, and especially finds of new species.

The desire to be reimbursed for large expenditures in collecting, frequently leads to the placing of abnormally high prices on the specimens secured, while the finding of a new mineral engenders an enthusiasm which seems to justify these prices, though it actually does not.

If there is a considerable supply of specimens, high prices are not warranted, even though the cost to the finder is more than the total he can fairly ask for them. For example: if A spends $500, in visiting a locality and discovers one hundred specimens of a new, massive, calcium silicate, his specimens are not worth any more than the one hundred specimens of another new, massive, calcium silicate, scarcely distinguishable from A's, which B secures at a cost of $100. A specimen of one placed alongside of the other in a distant museum, whose curator knows that they are equally abundant and practically identical in quality, would not be appraised at five times the value of the other. A scientific valuation of these two minerals unquestionably would rate them as of the same value, regardless of their cost. Cost, then, is not a fair basis of valuation; neither is the price which a collector or a museum may pay.

About fifty years ago, Norman Spang of Etna, Pennsylvania, sold to Clarence S. Bement of Philadelphia, the pick of his collection of minerals. Each of these gentlemen had had large experience in buying minerals all over this country and Europe and they were probably better qualified than any other American collectors to appraise the value of such minerals. Each placed his own valuation on the individual specimens selected and their respective totals, approximating $22,000, were only about $100 apart. While it is not likely that either party scientifically appraised the specimens, their substantial agreement on values was doubtless due to the fact that their long years of experience in purchasing specimens made each an expert in recognizing the points which give to one specimen a value much in excess of another.

FACTORS IN SCIENTIFIC VALUATION

Eliminating from consideration many minor points, the chief factors in a scientific valuation of minerals are the following: (1) Commercial value, (2) Chemical composition, (3) Form, (4) Miscellaneous characteristics, (5) Rarity.

(1) Commercial Value

The determination of its commercial value, if any, should always be the first step in scientific valuation. If a mineral has only small commercial value this may be disregarded in its appraisal; but if its commercial value is high it is usually the most important factor to be considered. For example, a group of dioptase crystals or an Egremont twin of calcite has practically no commercial value, while its value as a scientific specimen is great. On the other hand a large, transparent diamond octahedron would be appraised on the basis of its gem value even though it possessed no greater educational value than an octahedron of hauerite or of magnetite whose commercial value was nil.

Commercial value would also be the controlling factor in valuing a heavy, formless gold nugget, possessing no elements of scientific interest, yet of large intrinsic value. Similarly a nugget of platinum or of iridosmine would have very high commercial value, though no real scientific value. In these instances, and others of like nature, the task of the appraiser is merely to ascertain the commercial value.

Assistance in the determination of commercial values will be found in the weekly "Market Report" in the *Engineering and Mining Journal*, but this should invariably be supplemented by making direct inquiries of merchants or brokers handling the material being appraised, for it would be easy to be misled into believing that a mineral possessed far higher value than it does, if the price of the metal there noted were taken as the basis of valuation. Due allowance must always be made for the cost of extraction, which at times is very high. Bismuth is there quoted at $2.75 per pound, and this quotation will correctly guide a mineral appraiser to the approximate commercial value of a specimen of native bismuth; but a quotation of around 14 cents per pound for antimony would not justify the adoption of that price as the scientific value of a specimen of native antimony.

Asbestos is the only non-metallic mineral quoted whose commercial value is not much less than its scientific value; but the quotations on "metallic ores" are worthy of consideration in appraising the value of some of the minerals containing tantalum, tungsten, uranium and vanadium.

The appraisal of important gems, either cut or rough, should not be undertaken by anyone who is not a gem expert. Slight differences in color, so small as not to be discerned by the untrained eye, may make one gem worth much more than another. A specimen of a gem mineral which is not perfect enough to be usable for cutting is frequently much overvalued. If it will not yield marketable gems it has no gem value and ought to be valued merely as a scientific specimen.

Polished specimens of the decorative stones, other than those used for jewelry, may be conservatively appraised by adding to the value of the rough material double the cost of slicing and polishing. Of course this does not apply to specimens of exceptional excellence, nor to carvings, nor to pieces cut into ornaments of any kind. Such items in a collection may be properly regarded as articles of virtu and valued accordingly, rather than as mineralogical specimens.

(2) Chemical Composition

Minerals whose value is increased because of their chemical composition may be divided into three groups, namely: those containing (a) rare metals, (b) rare earths, (c) several acid radicals, or those in which the radicals are comparatively rare.

(a) In the first group are included minerals containing the precious or rare metals, gallium, germanium, gold, indium, iridium, osmium, palladium, platinum, rhodium, rubidium, ruthenium, silver, thallium and others. Practically all of these have greater or less commercial value, but aside from the "precious" metals, they give value to the minerals in which they occur much more largely in proportion to their applications in the arts than to their actual rarity. Sphalerite containing gallium or indium is not very valuable, because these metals are not extensively used in the arts; on the other hand a mineral containing germanium, such as germanite or argyrodite, is of considerable value because of the wider use of germanium oxide.

(b) The presence of rare-earths in a mineral gives it a value which increases as the percentage or scarcity of the rare-earths increases. Polycrase is valuable as a rare-earth mineral, but the South Carolina polycrase, which contains only a minute quantity of scandium, is not more valuable on that account, while the mineral thortveitite which contains a large percentage of scandium is exceedingly valuable. Allanite, though containing a number of the rare-earths, is not of much value because other minerals are so much better sources of supply. The number of known rare-earth minerals is steadily increasing, but the high values placed upon them do not seem to be justified by any chemical demand for the rare-earths. As such minerals are almost always discovered by good mineralogical chemists, they would be performing a real service to the mineralogical community if they were to keep the prices low.

(c) Only a few minerals contain more than two acid radicals. Other things being equal, minerals containing three radicals would be worth at least twice as much as those having only one or two; but it so happens that many of these are also rare-earth minerals and owe their high values largely to that fact. In the case of thaumasite (a sulphate, carbonate and silicate), a high valuation is prevented by the fact that there is an oversupply of the mineral. Polymignite contains three radicals and small amounts of two others, and this fact, coupled with its rarity, gives it high value.

Minerals containing rare acid radicals, such as the tungstates, uranates and molybdates, happen also to be in commercial demand. This makes it difficult to figure out what part of their high values is due to the rarity of the radical.

(3) FORM

Large, perfect crystals, with brilliant faces and many of them, or groups of such crystals, other things being equal, are the most valuable forms of minerals. It is not possible. however, to adopt any standards for the valuation of minerals in general according to their crystallization. This is due in part to the fact that crystals are much rarer in some species than others, and also because the simplest forms of crystallization are rarer in some species than highly modified crystals. For example, a cube of garnet, even though it be present only as a small modifying form, would be worth two to ten times as much as good crystals which are combinations of the dodecahedron and trapezohedron, yet the latter form has six times as many faces as the cube. A knowledge of which faces are rare and which are common on each species, is essential to the correct appraisal of the values of crystals.

Perfection of crystal form may make a simple form of a mineral worth much more than a complex form. Indeed everyone who endeavors to secure perfect crystals knows how exceedingly difficult it is to obtain some of the simplest forms of crystals even reasonably free from distortion, superficial irregularities and bruises. A perfect crystal has never been found, and because of this fact an intelligent appraiser will place a very high value on a simple crystal of a common mineral if it nearly approaches perfection. A 2.5 cm. cube of fluorite might be fairly appraised at five dollars if it is nearly perfect and has brilliant faces, while another of the same size, distorted and somewhat bruised, would be correctly appraised at ten to twenty-five cents.

While loose crystals are more desirable for crystallographic study than those attached to the rock, the latter are often worth from two to five times as much as parts of a mineralogical collection.

A specimen with crystals attractively scattered over the gangue is worth from two to five times as much as another in which the crystals are closely grouped.

A specimen composed of a few large crystals is worth from two to five times as much as a specimen with the same quantity of the mineral in the form of many small crystals. This is especially true of large museum groups.

Freedom from bruises adds very much to the value of a crystal; for example, an Arkansas quartz crystal with both terminations unbruised might bring five dollars, while the same crystal, if one of the terminations were even slightly broken, would not bring over two dollars, and if both terminations were at all conspicuously damaged, might not be worth more than fifty cents. A great many collectors fail to appreciate the extent to which bruising lessens value.

In minerals not occurring in crystals, an attractive form is worth much more than a massive specimen; thus a botryoidal psilomelane is worth at least ten times as much as a massive one of the same weight, while the beautiful manganese oxide dendrites on limestone may be worth several hundred times as much as the same quantity of the mineral in purely massive form. If the dendrites are enclosed in translucent chalcedony, forming "moss agates," their value may be thousands of times the value of the massive form.

The valuation of moss agates presents a problem in scientific appraisal which must not be lightly passed over, namely whether the use of specimens of unusual beauty for ring stones and brooches and their sale in large numbers, chiefly in tourist resorts, establishes a mineralogical value identical with the high prices which they bring in tourist stores, where \$5 to \$25 are common prices and \$50 to \$100, and even more, are asked for exceptional specimens, on the basis of fancied resemblances to landscapes or various objects. It would seem safe to regard such prices as valuations of objects of art, or curios, rather than of mineralogical specimens, and if they are introduced into mineral collections and values commensurate with their cost are assigned to them, those values must represent art rather than science. Nevertheless, because many persons who are not mineral collectors create a demand for these objects their high prices are maintained and, therefore, their valuation as portions of such mineral collections as include them can scarcely be less than the market prices.

Many of the imitative forms which minerals, at times, assume are worth much more than their massive forms; thus "kidney ore" will bring ten to fifteen times as much as massive hematite. Other illustrations of increased value due to imitative forms are mammillary malachite, globular pectolite, coralloidal aragonite or "flos ferri," reticulated cerussite, stalactitic calcite and limonite, "star" quartz, pseudomorphs of chalcedony after coral, of opal after mollusk shells.

(4) Miscellaneous Characteristics

(a) Beauty. Theoretically beauty is not a factor in scientific valuation, as it is an element of art rather than science, but practically it is one of the most important factors in determining the value of mineral specimens. Even the most scientific mineralogist cannot resist the charms of beauty and will rarely fail to give preference to a specimen of real beauty in adding to his collection. From a scientific standpoint two crystals of beryl which are identical in size, luster, number of faces and sharpness of edges, are equally desirable for scientific study; but beauty instantly imparts largely increased value to the one which is transparent and of rich blue color, when compared with the other which is opaque and of dull grayish-green color. The blue crystal is conservatively appraised as worth twenty times as much as the other. No museum curator can afford to ignore the universal admiration of beauty, even though it costs so much to satisfy it.

Shapeliness is an element of beauty which possesses real value. A shapely specimen of rectangular outline and evenly sloping from the edges to the center, is worth at least twice as much as the same bulk of material of triangular outline.

The general neatness of a specimen is another element of beauty which contributes to its value. For example, if a specimen has its crystals massed along the edge it is worth not more than half as much as if they were attractively scattered over the surface of the matrix.

A collector with a cultured, esthetic taste will see at a glance the various elements of beauty, such as color, luster, diaphaneity, shapeliness, neatness and perfection of form, and will instantly select the one specimen from among a hundred which combines all of these qualities and will not be satisfied with any other, even though he finds that it is valued at several times as much as many of the others.

(b) SIZE. Other things being equal, specimens of cabinet sizes. 4×5 cm. to 7.5×10 cm. should be valued in proportion to their size, though crystals of fine quality increase in value much more than proportionally to their size. When specimens are larger than 7.5×10 cm., unless they are of high enough quality to be acceptable to museums, or can be broken up advantageously into specimens of cabinet sizes, they are worth very little. This fact is often overlooked, but the addition of specimens to a collection merely because they are of large size, hurts rather than improves a collection.

(c) HARDNESS, has but slight mineralogical value, but it contributes much to the commercial value of gems and it is the chief property of value in the abrasives.

(d) UNUSUAL CHARACTERISTICS. Freak specimens are always more valuable than those which lack unusual characteristics. Thus a twisted tourmaline should be worth two or three times as much as a simple crystal; a beryl broken, by nature, into several pieces with quartz filling the space between the pieces, will be correctly appraised at several times as much as the same crystal in one piece; a quartz crystal, distorted so that it resembles a cube, is easily worth double the value of a symmetrical crystal. Additional value is given to crystals if some of their faces show attractive etching, if crystals of other minerals are grouped in symmetrical position on one or more of their faces, if crystals are grouped in parallel position, if movable bubbles exist within the crystal, or if there are attractive enclosures of other minerals. The wonderful zonal growth shown in some cross sections of tourmaline crystals from Madagascar, increases their value several fold. Many other unusual characteristics exist which add more or less to the value of a crystal.

(e) ASSOCIATED MINERALS. While the associated minerals do not, as a rule, increase the value of a specimen, there are many instances in which they do. This is particularly true if the associates give a clue to the genesis of the mineral; for example, a phenacite specimen with crystals of both phenacite and fluorite implanted on a crystal of beryl, whose termination is deeply etched, as is sometimes seen at Mount Antero, Colorado. A cleavage mass of galena, surrounded with bands of anglesite and cerussite is of interest to one studying the origin of the secondary minerals, and in like manner many specimens possess interest to the geologist and will have added value in a scientific collection because of their associated minerals. The most notable increases in value due to associated minerals occur when the matrix of a mineral is of an unusually attractive character, for example wire gold on a limpid quartz crystal might be worth two to ten times as much as the gold alone. Drusy quartz on bright blue chrysocolla or on rich green atacamite or malachite, might be valued at five to twenty times the value of the quartz alone. Every collector will think of many other instances of attractive associations. While there is invariably an increase in value when such associations occur, in many instances they are so common as to add but little to the value; for example, apatite in salmon-colored calcite, vesuvianite in blue calcite.

(5) RARITY

Rarity in minerals may be classed as due to the quality of the specimen being greatly superior to the average, or to the scarcity of the species, variety or form. In each instance rarity adds greatly to the value of a specimen. It is, indeed, one of the most important factors in the scientific valuation of minerals.

Every collector has experienced the thrill of securing a unique specimen; every curator points with pride to certain specimens which are finer than those in any other collection. It was the rarity of such large crystals which led one of our American collectors to pay $1000 for a single large octahedron of gold, though its bullion value was probably not over twenty dollars. It was the rarity of size and excellence of quality which led Mr. Holden to pay $5000, for the two magnificient crystals of kunzite now in the Harvard University collection. It is the rarity of such superlative beauty of color and luster and transparency, linked with the perfection and mammoth size of the matchless specimens of proustite in another of our great American collections which gives them a value so vastly greater than that of the silver they contain. In the wonderful collection of silver specimens in Kongsberg, Norway, there is a spinel-twin of silver of marvelous size and perfection, which might reasonably be appraised at a thousand times its bullion value. The correct appraisal of such specimens is a difficult task and even experts would doubtless disagree in some instances. These are all illustrations of rarity due to superior quality.

If instead of being rare, superlatively fine crystals of a mineral occur in great abundance, the law of supply and demand will largely determine their prices. An excellent illustration of this is the great find of golden calcite crystals at Joplin, Missouri, about thirty years ago. Many hundreds of them were brought on the market at prices not more than a third of those they would bring today, after the exhaustion of the supply.

There are rare varieties of some common species which command much higher prices than other varieties of the same mineral or similar varieties of other species; thus the satin spar variety of calcite is worth five times as much as a granular or a cleavable calcite and double the value of the gypsum satin spar. Other illustrations are given in discussing "Form."

It should not be overlooked that if a mineral species is not attractive, the demand for it will be very much smaller than if it were beautiful. Even though the species is a new one and might, therefore, be expected to bring a good price, it is actually worth only a low price, for its unsalability at a high price, will force a reduction in its valuation to such a figure as will attract buyers because of its cheapness.

Any systematic scheme of valuation must first determine whether the specimen has commercial value and if so what it is. Next the factor of rarity, or the number of specimens found, must be considered. The table presented herewith will serve as a starting point. All factors other than rarity are excluded, it being assumed that specimens are of standard size, 7.5×10 cm., pure or nearly pure, massive and of average quality. If only one specimen is found it is valued at $100, with steadily decreasing valuations until $2 is reached if one hundred specimens are found. This plan is roughly in conformity to the law of supply and demand. If the quality of the mineral is high the value would be greatly in excess of $100 for a single specimen, while if it is poor the value would be much less. Quality, however, is considered in a later table.

PRELIMINARY VALUATION ON BASIS OF RARITY

Specimens are of standard size, 7.5x10 cm., pure or nearly pure, massive, and of average quality.

Number of specimens found:	Value per specimen:	Total value of find:
1	$100.00	$100.00
2	75.00	150.00
3	50.00	150.00
4	40.00	160.00
5	35.00	175.00
6	30.00	180.00
7	25.00	175.00
8	22.50	180.00
9	20.00	180.00
10	18.00	180.00
12	15.00	180.00
15	12.00	180.00
20	10.00	200.00
25	8.00	200.00
30	7.00	210.00
35	6.00	210.00
40	5.50	220.00
45	5.00	225.00
50	4.50	225.00
60	4.00	240.00
70	3.50	245.00
80	3.00	240.00
90	2.50	225.00
100	2.00	200.00

COMPLETE SCHEME FOR THE VALUATION OF NEW MINERALS

There are many difficulties in the appraisal of specimens of varying quality. No such scheme of valuation as is herewith presented can possibly give definite figures or percentages, but it must leave much to the judgment of the appraiser, and to this extent it is not scientific. On the other hand, if mineralogists will take time to study the factors presented in this paper in connection with the second table, a much closer approximation to scientific valuation can be attained than has heretofore prevailed.

Scientific Valuation of a Mineral Specimen

Section A

If the specimen has commercial value:

1. Determine, as nearly as possible, what it is worth commercially.
2. Determine its value as a specimen by adding to or deducting from its commercial value, in accordance with Section B: 2, 3, 4, 5, 6, 7.

Section B

If the specimen has no commercial value:

1. Assign a preliminary valuation on the basis of its rarity (see table above).
2. Modify this valuation according to size.
3. If it is not massive, increase the valuation as suggested under "Form."
4. If it has an unusual chemical composition, increase its valuation as suggested under "Chemical Composition."
5. If it has unusual beauty, increase the valuation as suggested under "Beauty."
6. If it has other exceptionally interesting characteristics, increase the valuation accordingly.
7. If its associated minerals are of unusual interest, add a little for them.

The figure thus obtained will be its value.

Illustrations

Silver: an old mineral, with commercial value.

Specimen is 7.5×10.0 cm., weighs 620 grams (about 20 oz. Troy), is shapely and well crystallized.

A. Commercial Value:

20 oz. Troy at 50c oz.	$10.00
Less estimated cost of selling	2.00
Net commercial Value	$ 8.00

B. 1, 2.	Rarity and size not applicable.	
3.	Excellence of crystallization quadruples value	$32.00
4.	No change for chemical composition.	
5.	Unusual beauty, including shapeliness, brilliancy and attractive placing of crystals, increases value	16.00
6, 7.	Value not changed by other characteristics or associated minerals.	
Value of Specimen		$48.00

Pyroxmangite: a new mineral, no commercial value.

Specimen is 5×15 cm. and shows good cleavage.

Total number of specimens found, 21, as follows:

1 specimen 5×15 cm.	75.00 sq. cm.
20 average 3.75×7.5 cm.	562.50 sq. cm.
Total area of find	637.50 sq. cm.

equals 8.5 (say 9) specimens of standard size, 7.5×10 cm.

There being no commercial value, appraise on basis of rarity for 9 specimens.

B. 1.	Preliminary valuation	$20.00
2.	Valuation not changed on account of size, as area equals standard size.	
3.	Increase valuation because of cleavage to	25.00
4.	No change for composition.	
5.	Poor shape decreases value 20%, to	20.00
6, 7.	Value not changed by other characteristics or associated minerals.	
Value of specimen		$20.00

BALDAUFITE: a new mineral; no commercial value.

Specimen is 5×7.5 cm., half standard size; shows a small group of minute crystals and a little of the massive mineral, on matrix.

Exact number of specimens found not known, but it is certainly very scarce; assumed to be as follows:

1 spec. 7.5×10 cm.	75.00 sq. cm.
3 spec. 5.0×7.5 cm.	112.50 sq. cm.
4 spec. 3.0×5.0 cm.	60.00 sq. cm.
6 spec. 2.0×4.0 cm.	48.00 sq. cm.
Total area of find	295.50 sq. cm.

equals 4 specimens of standard size, 7.5×10 cm.

B. 1.	Preliminary valuation	$40.00
2.	Size reduces value 50% to	20.00
3.	Increase valuation because of crystallization to	40.00
4.	No change for composition.	
5.	Beauty insufficient to justify increase in valuation.	
6, 7.	No exceptional characteristics or associated minerals add value.	
Value of specimen		$40.00

CONCLUSION

It is hoped that this paper, which plows the first furrow in the field of scientific valuation of minerals, may stimulate consideration of a neglected subject and ultimately lead to the adoption of some standards of valuation which will check the present tendency to overvaluation, and by making the appropriations of the museums and colleges and the dollars of the collector, go farther, will benefit all who love minerals for their beauty of form and color, and who find their study the open sesame to many of the great truths of the universe, so long locked up in the atoms and molecules of their crystals.

ARGENTITE AND ACANTHITE

H. Schneiderhöhn,*
University of Freiburg i/Br., Germany.

I have read with great interest the paper of Emmons, Stockwell and Jones[1] on the subject named above which forms an important contribution to our knowledge of the sulphides and of many sulphide ore deposits. I desire in what follows to offer a supplement to this paper by drawing attention to articles already published upon the subject which have apparently escaped the attention of the authors. In the first place, both Ramsdell[2] and at the same time F. Rinne[3] have made röntgenographic investigations of argentite and acanthite from Freiberg in Saxony and of artificial silver sulphide. The latter has proved that the röntgenograms of these three substances are alike and show an apparently orthorhombic, not isometric symmetry. I was, however, the first to show, in 1922,[4] by an optical method, the nonisometric and apparently orthorhombic symmetry of argentite. I was able to show that when examined in reflected polarized light between crossed nicols, polished sections of argentite and acanthite did not remain uniformly dark in all positions. On the contrary the individual grains varied in color as the preparation was turned under the microscope from light gray-blue in the position of illumination to dark gray or dark slate-blue in the position of extinction. *Argentite* and *acanthite*, which behave optically quite alike, *are* then *optically anisotropic*. It could generally be observed that an individual grain or even what appeared to be a crystal individual was actually not homogeneous but consisted of a large number of lamellae and of feather-like or spindle shaped parts which crossed one another for the most part, at right angles and possessed parallel extinction. Their arrangement was very similar to that of the lamellae which may be seen in leucite or boracite between crossed nicols at normal temperatures. I con-

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* Translated by Charles Palache, Harvard University.

[1] *Amer. Mineral.*, **11**, p. 326–328, 1926.

[2] *Amer. Mineral.*, **10**, p. 281, 1925.

[3] F. Rinne: Notiz über Silberglanz. *Zeitschr. Krist.*, **60**. p. 299–301, 1925.

[4] H. Schneiderhöhn: Anleitung zur mikroskop. Bestimmung und Untersuchung von Erzen und Aufbereitungsprodukten, besonders im auffallenden Licht. *Berlin*, **1922**, p. 206–210.

cluded as early as 1922 from this optical property which may be seen in well-polished preparations of argentite, sufficiently illuminated between crossed nicols, that, in considering the substance Ag_2S, we are dealing *with a paramorph, stable at ordinary temperatures as an orthorhombic modification, after an isometric modification, stable only at higher temperatures* (*above* 180°). Rinne, in 1925, in the article cited, confirmed this conclusion and showed further that there was a complete analogy between the inversion forms of argentite and chalcocite:

β—Argentite (orthorhombic) $\underset{\rightleftarrows}{179^\circ}$ α—Ag_2S (Isometric)
β—Chalcocite (orthorhombic) $\underset{\rightleftarrows}{91^\circ}$ α—Cu_2S (Isometric)

In *natural occurrences* of these two ores the temperature of their formation is the control for their inner structure. Both have a lamellar structure and are to be regarded as paramorphs if they have formed above the inversion temperatures, 179° and 91°, respectively. The twin lamellae, may be clearly recognized in argentite in polarized, reflected light, in chalcocite by etching with HNO_3. I described this lamellar paramorph of β-chalcocite after α-chalcocite minutely in 1920[5] and named it "*lamellar chalcocite.*" I showed that this "lamellar chalcocite" was a "*geological thermometer*" and was characteristic for primary chalcocite, that is for chalcocite that had not been formed by secondary enrichment ("descendente Zementation").[6] A similar rôle as a "geological thermometer" can now be assigned to "lamellar argentite" as I would call it. It also has been formed at an elevated temperature, i. e., above 180°, is of primary origin, and cannot be regarded as a product of secondary enrichment.

I desire to propose now that the name "argentite" (German: "Silberglanz") shall be employed as the name of the mineral and that the name "acanthite" shall be discarded. If by microscopic examination it be established that a paramorph after isometric Ag_2S is present, one can call this product "*lamellar argentite*" following the analogy of "chalcocite" and its paramorph, "lamellar chalcocite."

[5] *Idem:* Paramorphose von rhomb. Kupferglanz nach regul Senckenbergiana, Frankfurt a. M., **1920**, 2, p. 1–15; also Anleitung, **1922**, p. 213–215.

[6] *Idem:* Die Oxydations- und Zementations zone sulfidischer Erzlagerstätten. Fortschritte der Mineralogie. **1924**, 2. p. 67–160.

LYNDOCHITE—A NEW MINERAL OF THE EUXENITE-POLYCRASE GROUP FROM LYNDOCH TOWNSHIP, RENFREW COUNTY, ONTARIO.

H. V. Ellsworth,* *Ottawa, Canada.*

Introduction

This mineral occurs in a pegmatite dike on lot 23, con. XV, Lyndoch township, Renfrew County, Ontario. The occurrence has been known for many years, having been first described by the late Willet G. Miller in the 7th Report of the *Ont. Bureau of Mines*, **1897**, Part III, page 234. Dr. Miller notes microcline, microperthite, quartz, amazon-stone, black mica, smoky quartz, beryl, columbite, thin platy feldspar, black tourmaline and fluorite as occurring in the dike. He states further that: "There is also embedded sparingly in the feldspar another mineral which has not as yet been subjected to careful examination, but it appears to be a columbate. It has a vitreous lustre, is shining black in color, has a conchoidal fracture and resembles rather closely in general appearance certain specimens of the natural glass obsidian. There is also a brown mineral which appears to belong to the same chemical class as the two already described." (i. e., columbite and the unknown columbate). Walker and Parsons[1] also have described beryl and other minerals recently obtained from this dike.

Excellent crystals of the black columbate (lyndochite) collected at different times by A. T. McKinnon of this Department and the writer, have been in the Survey collection for several years. Owing to the roughness and distortion of the faces it has not been possible to make sufficiently exact measurements to be sure to what extent the interfacial angles differ from those of euxenite, but several fairly accurate contact measurements suggest a close similarity of forms and angles. The forms present have been identified as (100), (010), (110), (310) or (410) or both, (201), (111). These may be readily recognized in the photographs. (Fig 1) Measurements on one of the best crystals seemed to indicate that the axial ratio may be about the same as for euxenite. All the crystals are composite, due to parallel growths and twinning.

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* Published by permission of the Director, Geological Survey of Canada.

[1] Paper read at the meeting of the *Min. Soc. of Am.*, Dec. **1926**. The writer has not seen this paper. (See abstract in *Am. Mineral.*, **12**, 79, 1927.)

There seems to be a possibility that they may be only pseudo-rhombic and in reality characterized by a lower grade of symmetry.

The mineral is brilliant black en masse, reddish brown and translucent by strong illumination of the thin edges or splinters or in a powder under the microscope. Powder pale yellow. Isotropic. Lustre vitreous. Perfect conchoidal fracture. Cleavage none. Not as brittle as many minerals of this class. Hardness 6.5. Sp. Gr. 4.909 at 17.88°. Infusible.

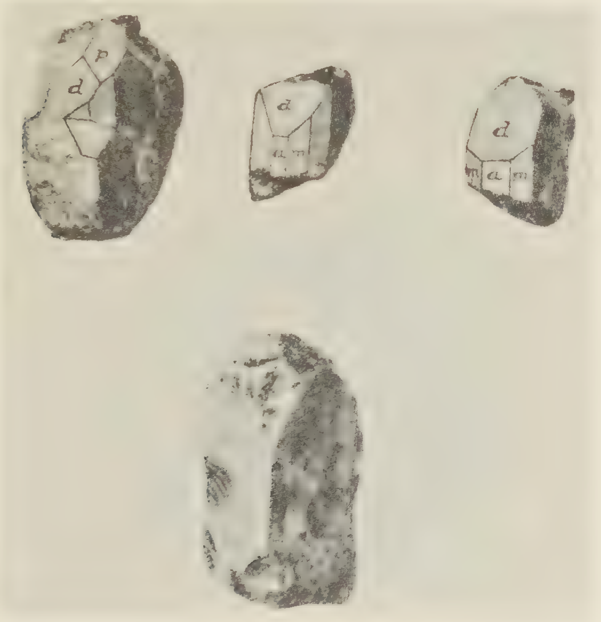

FIG. 1.
Lyndoch crystals oriented with *a* to the front, showing typical development of faces, parallel growths and twinning parallel to *b* bisecting the upper right hand crystal.

PREPARATION OF SAMPLES

Although a number of well developed crystals and crystal fragments were available, the selection of a suitable sample for analysis was complicated by the discovery that all the material, including even the most perfectly formed crystals contained scattered inclusions of an opaque black metallic looking mineral which proved to be columbite, easily distinguishable under the binocular microscope from the vitreous, semitransparent lyndochite. These inclusions fortunately are, for the most part, distributed in such a manner that it was possible, by breaking up the material into small pieces a few millimeters in size, to select fragments showing under the binocular no visible inclusions. This selection was very carefully carried out, any piece showing even the slightest amount of foreign material was rejected, so that the final sample was comprised of only the purest crystal fragments. Nevertheless thin sections of crystals showed that it would be impossible to obtain an absolutely pure sample as occasional microscopic inclusions exist in small amount even in the best material. These microscopic inclusions (Fig. 2) are plainly remnants of columbite in process of assimilation by the lyndochite, or perhaps more correctly, in process of transformation to lyndochite when the reaction was interrupted by a change in conditions; such as a decrease in temperature, a change in the character of the mother solution, or perhaps by the depletion of the reacting constituents.

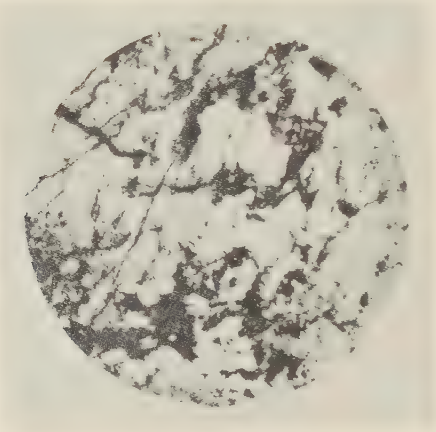

FIG. 2.

Photomicrograph of a thin section of lyndochite by transmitted light, showing black columbite inclusions, in an area in which the latter was particularly abundant. Minute detail visible to the eye is not reproduced in the photograph.

A small sample of the included material was also prepared but it was impossible to get any appreciable quantity entirely free from lyndochite and it was estimated that the pure included material made up approximately 2/3 or 3/4 of the total sample of 0.0190 grams, the remainder, of course, being adhering lyndochite.

An analysis yielded the following results:

Analysis of Lyndochite, Lyndoch Township, Renfrew Co., Ontario.

	Per cent.	Mol. Wt.	Bases	Acids
PbO_2	0.37	222	0.0017	
(Pb=0.34)				
UO_2[1]	0.67	270.2	0.0025	
UO_3	0.04	286.2	0.0001	
(U=0.63=0.74 U_3O_8[2])				
ThO_2	4.95	264	0.0187	
(Th=4.35 x 0.38=1.65 U equivalent)				
$(Ce, La, Di)_2O_3$	4.34	330	0.0131	
$(Yt, Er)_2O_3$ (Av. At. Wt.=105.4)	18.22	258.8	0.0704	
FeO	0.77	72	0.0107	
Fe_2O_3	1.32	159.7	0.0076	
MnO	0.59	70.9	0.0083	
Al_2O_3	0.13	102.2	0.0013	
BeO		25.1		
CaO	4.86	56	0.0868	
MgO	0.13	40.3	0.0032	
ZrO_2	0.04	122.6		0.0003
SnO_2	0.12	150.7		0.0008
TiO_2	16.39	80.1		0.2046
Ta_2O_5	3.84	443		0.0087
Cb_2O_5	41.43	266.2		0.1556
SiO_2	0.07	60.3		0.0001
F	Not detected		0.2244	0.3701
$H_2O-110°$	0.06			
$H_2O+110°$	1.90	18	(0.1090)	
He, etc	Not determined			
Loss on ign.	(1.76)			
	100.24			

[1] Determination on 2 g.

[2] Determination on 5 g.

Sp. Gr.=4.909 at 17.88°

$Pb/U+0.38\ Th=0.15=1100$ million years.

Partial analysis of inclusions (columbite) in Lyndochite:—

	Per cent	
T_2O_5 Cb_2O_5	62.6	(probably low)
TiO_2	5.8	

The partial analysis of the included mineral serves to show plainly from the high percentage of Cb and Ta oxides and the small amount of Ti, that it must be, or must have been originally, columbite, now probably somewhat altered by the enclosing lyndochite.

Compared with typical euxenites, to which lyndochite seems to be most nearly related, especially in crystal form, considerable differences appear. Whereas euxenites seldom have less than 5%, usually between 5 and 15 and may have as much as 20%, of uranium oxides, this mineral has less than one, while it has two or three times the usual amounts of ThO_2 and CaO. Further, it is higher in Cb_2O_5 and total Ti, Ta, Cb oxides than any euxenites hitherto known to the writer. Some of this excess of acid earth oxides is to be credited to microscopic inclusions of columbite but the larger part must be present in chemical combination, for if all the MnO of the lyndochite be considered as due to columbite inclusions alone, there would be at most only 3% of columbite present and this would account for only about 3/4 of one per cent of the excess of Ta, Cb oxides. The high columbium content apparently results from the partial digestion of columbite which acted as nuclei around which the lyndochite crystallized. Advocates of the replacement theory in pegmatites would doubtless consider this a typical example of such action.

Thus it appears that lyndochite is one of the numerous theoretically possible isomorphous minerals of the euxenite-polycrase group—essentially a thorium-calcium euxenite with uranium only a minor constituent. Opinions may differ as to the advisability of classifying it as a new mineral but it appears to be at least as much entitled to a distinctive name as is polycrase. It is noteworthy that in spite of its exceptional composition, the lyndochite displays a strong tendency to crystallize, the crystals as they occur in the rock are often almost perfect, though it is seldom possible to remove them without more or less injury. The mineral, therefore, is apparently, or was originally, a definite chemical compound.

Hence it appears that minerals of the euxenite-polycrase-lyndochite group may vary in content of Ti, Ta, Cb oxides from about 48 to 62 per cent, and in uranium content from 0.74 to 20% of U_3O_8, while the total rare earths plus thorium remains fairly constant.

Further points of interest are; first, that the age of the lyndochite as here determined agrees exactly with the best results from the Ontario uraninites; secondly, that silica is present in only minute amount. An apparent connection between silica content and age results in the case of the titano-tantalo-columbates-*ie*-that those containing appreciable silica give low results while those with no silica agree with the uraninites—was noted in an earlier paper.[2]

MINERAL ASSOCIATIONS

Lyndochite occurs chiefly in a pink microcline feldspar which with white and smoky quartz and some green amazonstone makes up the mass of the dike. Much of the microcline contains some plagioclase, as noted by Miller. This is true even of the platy variety. Well formed beryl crystals usually from 1 to 3 inches sometimes 6 or 8 inches in diameter and 3 feet or more in length occur rather abundantly in places, and are often associated with the peculiar platy feldspar which seems to be characteristic of many beryl occurrences. A few crystals with well developed terminations have been found, but they are exceptional. Occasional crystals may be in part clear and transparent but the color is not attractive, having a very pale bluish or greenish tint, or almost colorless. Thin, flat disc-shaped masses of columbite[3] with concentric markings reach a diameter of a foot or more but are rarely more than 1/2 inch thick. Also crystal aggregates of zircon or cyrtolite occur the size of a fist. A few red garnets in good crystals up to 2 inches in diameter have likewise been found and a small amount of fluorite. Magnetite is abundant in places. There is reason to believe that bismuthinite was also found, as this mineral is recorded[4] as occurring in a dike with beryl in the same township, and Mr. John Sullivan, the discoverer of the dike, some years ago informed the writer that he had found in earlier years a mineral answering to the description of bismuthinite.

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[2] Ellsworth, H. V. *Am. Mineral.*, **11**, 329, (1926).

[3] Analyzed by Dr. W. L. Goodwin (Miller, W. G., *Rept. Ont. Bureau of Mines*, **1907**, *loc. cit.*), and more recently by E. W. Todd (Walker, T. L., and Parsons, A. L., *Contributions to Canadian Mineralogy*, **1923**, p. 34.)

[4] *Geol. Surv. Canada. N. S* . **VIII**, 14R.

The dike was almost entirely covered by soil, brush, etc., only a few square yards being exposed, until a year or so ago when it was opened up in an attempt to produce beryl in commercial quantities. Mr. Eardley-Wilmot of the Mines Branch, Department of Mines, informs me that the dike can now be seen to be of considerable size, the beryl occurring over a width of 15 feet, the total width not being exactly ascertainable, and that it can be traced for 200 feet or more in a north-easterly direction.

NOTES AND NEWS

NAMES FOR THE SYMMETRY-CLASSES BASED ON AXES

Edgar T. Wherry, *Washington, D. C.*

While the crystal systems have been assigned different names by various authors, there is on the whole a general agreement as to which are preferable, and uncertainty rarely arises as to what system is intended, even when the less familiar terms are employed. With the thirty-two symmetry-classes, however, it is a different story. Few of them have had less than 10 distinct designations (including names, letter-symbols, and numbers) assigned, and as noted by Spencer[1] one of the hexagonal classes has received at least as many as 31. It would indeed be highly desirable if some general agreement could be reached as to the names to be used for the classes, as urged by Spencer, but those he recommends seem capable of considerable improvement. A new, relatively simple, series of names is here put forward, as possibly suitable for general adoption.

The most systematic set of names in wide use is that of Groth, each class being characterized by its general form. There are two principal objections to this plan, the first that the names of symmetry-classes ought to be based on symmetry rather than on forms, and the second that the general form names are unnecessarily cumbersome. Dana endeavored to avoid the second objection by using names of other than the general form for some classes, and descriptions of peculiar features for others, and Spencer follows the same plan, but this does not answer the first objection, and introduces the further disadvantage of lack of uniformity.

Sets of names based on symmetry are used by some authors, notably Miers and other English crystallographers, and one of these sets has been adopted in this country by Phillips.[2] The chief objection to it lies in its cumbersomeness, which is scarcely less than that of the Groth series.

The class-names noted in the preceding paragraph are based on both planes and axes of symmetry. The writer's proposal involves the use of names based as far as practicable on symmetry axes only. They are brought out in the accompanying tabulation, which is self-explanatory.

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[1] L. J. Spencer, *Mineralog. Mag.*, **20,** 361 (1925).

[2] Mineralogy, 1912.

CUBIC SYSTEM		
Holosymmetric (fluorite)[3] Holoaxial (cuprite)	Alternating (pyrite) Alternating polar (sphalerite)	Digonal-polar (ullmannite)

TETRAGONAL SYSTEM		HEXAGONAL SYSTEM		
Tetragonal subsystem	Alternating subsystem	Alternating subsystem	Hexagonal subsystem	Trigonal subsystem
Holosymmetric (octahedrite)	Alternating (chalcopyrite)	Alternating (calcite)	Holosymmetric (beryl)	Holosymmetric (benitoite)
Polar (silver fluoride)	Alternating-monoaxial (meliphanite)	Alternating-monoaxial (dolomite)	Polar (iodyrite)	Polar (tourmaline)
Holoaxial (nickel sulfate)			Holoaxial (high-quartz)	Holoaxial (quartz)
Monoaxial (scheelite)			Monoaxial (apatite)	Monoaxial (?)
Monoaxial-polar (wulfenite)			Monoaxial-polar (nephelite)	Monoaxial-polar (sodium periodate)

RHOMBIC SYSTEM	MONOCLINIC SYSTEM	TRICLINIC SYSTEM
Holosymmetric (barite) Polar (hemimorphite) Holoaxial (epsomite)	Holosymmetric (gypsum) Holoaxial-polar (lithium sulfate) Anaxial (clinohedrite)	Holosymmetric (chalcanthite) Asymmetric (calcium thiosulfate)

This method of naming and arrangement of classes is not only relatively simple and systematic, but it also brings out certain correspondences between classes in different systems which have some theoretical interest. In particular, it disposes once for all of the question as to whether there are 6 or 7 systems, and as to whether certain classes really belong in the hexagonal or in a trigonal system. The tetragonal system falls into two subsystems, on the basis of whether the singular axis possesses simple or alternating symmetry; and the hexagonal correspondingly falls into three, making it plain that the trigonal should rank as a subsystem, and not as an independent system of equal rank with the other six.

[3] It is understood that the writer does not claim that the compound cited belongs structurally in the class to which it is referred, thus cuprite appears to be structurally holosymmetric, and only superficially holoaxial, and similar relations seem to hold with nickel-sulfate-6-hydrate, nephelite, wulfenite, and perhaps others. As, however, most crystallographic text-books use the superficial rather than the structural symmetry as characteristic of a compound, looking up in them the compounds given here will make it possible to ascertain the class-name, letter, or number preferred by the respective author.

CLASSIFIED LIST OF MINERALS DESCRIBED OR DISCREDITED DURING 1916–1922 INCLUSIVE

(Supplementary to previous lists)

"Kalgoorlite" (1922)	complex sulfide	shown to be a mixture	**10**, 22.
Lilianite (1921)	$Pb_3Bi_2S_6$	species rank established	**9**, 43.
"Alkali-spinel" (1922)	complex Mg oxide	homogeneity not established	**12**, 231.
"Rancieite" (1921)	complex Mn oxide	homogeneity not established	**9**, 20.
"Iron hydroxide" (1921)	complex Fe oxide	distinctness not established	**9**, 44.
Elatolite (1922)	$CaCO_3$	high-temperature form	**11**, 107.
"Calcioancylite" (1922)	complex Sr carb.	=calciferous ancylite	**12**, 98.
Hydrotalcite (1921)	$Mg_6Al_2CO_3(OH)_{16}$	redefined ($+4H_2O$)	**9**, 21.
Stichtite (1921)	$Mg_6Cr_2CO_3(OH)_{16}$	redefined "	**9**, 22.
Pyroaurite (1921)	$Mg_6Fe_2CO_3(OH)_{16}$	redefined "	**9**, 22.
Salmoite (1921)	complex Zn phos.	optically distinct	**12**, 58.
"Cornetite" (1922)	complex Cu phos.	=var. of pseudomalachite	**9**, 233.
Kolovratite (1922)	complex Ni vanad.	probable new vanadate	**11**, 136.
"Kurskite" (1919)	complex Ca phos.	homogeneity not established	**9**, 118.
"Meyersite" (1922)	complex Al phos.	homogeneity not established	**9**, 156.
Pseudowavellite (1922)	complex Al phos.	probable new phosphate	**12**, 231.

CLASSIFIED LIST OF MINERALS DESCRIBED OR DISCREDITED DURING 1916–1922 INCLUSIVE

"Barroisite" (1922)	amphibole	distinctness not established	11, 167.
"Fluortamarite" (1922)	amphibole	distinctness not established	11, 217.
"Rimpylite" (1922)	amphibole	distinctness not established	11, 167.
"Weinschenkite" (1922)	amphibole	name preoccupied	11, 167.
"Mesodialyte" (1922)	eudialyte	distinctness not established	12, 97.
"Yuksporite" (1922)	pectolite	distinctness not established	12, 58.
"Hoegtveitite" (1922)	zircon (alvite)	homogeneity not established	12, 97.
"Cergadolinite" (1922)	gadolinite	=ceriferous gadolinite	12, 97.
"Chromepidote" (1920)	epidote	=chromiferous epidote	12, 97.
"Vanadiolaumontite" (1922)	zeolite	homogeneity not established	12, 97.
"Ramsayite" (1922)	complex Ti sil.	=var. of lorenzenite	11, 136.
"Loparite" (1922)	complex Ti sil.	homogeneity not established	12, 97.
Aluminium-epidote (1916)	chemical name for	clinozoisite.	
Arsenioardennite (1922)	chemical name for	end-member of series.	
Clinoamphibole (1922)	group name for	monoclinic amphiboles.	
Ferriepidote (1920)	chemical name for	end-member of series.	
Metabiotite (1921)	chemical name for	biotite changed by heating.	
Metachabazite (1921)	chemical name for	chabazite changed by heating.	
Orthamphibole (1917)	group name for	orthorhombic amphiboles.	
Orthaugite (1917)	group name for	orthorhombic pyroxenes.	
Pseudogymnite (1921)	synonym of	pseudodeweylite.	
Vanadioardennite (1922)	chemical name for	end-member of series.	

E. T. W.

CLASSIFIED LIST OF MINERALS DESCRIBED OR DISCREDITED DURING 1923

"Modderite"	a Co sulfide	=jaipurite	11, 77.
Cubanite	$CuFe_2S_3$	species rank established	8, 135.
"Chalmersite"	$CuFe_2S_3$	=preceding	8, 136.
Berthonite	$Cu_3PbSb_3S_7$?	a new sulfosalt	9, 173.
Chloroxiphite	$CuPb_3Cl_2O_2(OH)_2$	a new hydroxychloride	9, 96.
Diaboleite	$CuPb_2Cl_2(OH)_4$	a new hydroxychloride	9, 97.
Crednerite	$CuMn_2O_4$	redefined	9, 97.
Trevorite	$NiFe_2O_4$	species rank established	9, 98.
"Gahnite, cobaltiferous"	$(Zn, Fe, Co)Al_2O_4$	a new variety	8, 147.
"Coronadite"	complex Pb oxide	a mixture?	8, 209.
"Romanechite"	complex Mn oxide	a mixture?	8, 210.
Schoepite	complex U oxide	formula not established	8, 67.
"Borgstroemite"	complex Fe sulf.	= var. of carphosiderite	10, 180.
Argentojarosite	$AgFe_3(SO_4)_2(OH)_6$	a new sulfate	8, 230.
"Pisekite"	complex Ce phos.	=var. of monazite	11, 136.
"Stasite"	Pb-U phosphate	=dewindtite	10, 201.
Parsonsite	$Pb_2UO_2(PO_4)_2 \cdot H_2O$	a new phosphate	8, 150.
Finnemanite	$Pb_5Cl(AsO_3)_3$	a new arsenite	8, 230.
Weslienite	$Na_2Ca_3FeSb_4O_{15}$	a new antimonate	9, 174.

CLASSIFIED LIST OF MINERALS DESCRIBED OR DISCREDITED DURING 1923

Ellsworthite	$Ca(CbO_3)_2 \cdot H_2O+X$	a new columbate	**9**, 16.
"Manganomossite"	complex Mn col.	=manganiferous mossite	**12**, 98.
"Taramite"	amphibole	distinctness not shown	**11**, 219.
"Fluotaramite"	amphibole	distinctness not shown	**11**, 217.
"Chinkolobwite"	complex U sil.	distinctness not shown	**9**, 156.
"Eakleite"	complex Ca sil.	=xonotlite	**8**, 181.
Clinoptilolite	$CaAl_2Si_{10}O_{24} \cdot 7H_2O$	"crystallized mordenite"	**8**, 94.
"Flokite"	$CaAl_2Si_{10}O_{24} \cdot 7H_2O$	=preceding	**8**, 94.
Faroelite	Na-Ca-Al sil.	species rank inferred	**8**, 124.
"Gonnardite"	Na-Ca-Al sil.	=preceding	**8**, 124.
Anauxite	$H_{16}Al_6Si_{10}O_{37}$?	species rank established	**10**, 201.
"Errite"	complex Mn sil.	distinctness not shown	**10**, 107.
"Parsettensite"	complex Mn sil.	=preceding?	**10**, 107.
"Tinzenite"	complex Mn sil.	homogeneity not shown	**10**, 108.
"Befanamite"	complex Sc sil.	=var. of thortveitite	**11**, 137.
"Manganoneptunite"	titanosilicate	=manganiferous neptunite	**12**, 96.

See also Report of the Committee on Nomenclature and Classification of Minerals, topics 1 and 2, *Am. Mineral.*, **8**, 50-52 (1923). The classified list for 1922 appeared in *Am. Mineral.*, **9**, 175 (1924).

E. T. W.

QUARTZ FROM IOWA CANYON, NEVADA

Lloyd W. Fisher, *Brown University.*

The interesting specimens of quartz described in this paper were sent the writer by Mr. H. G. Clinton, of Manhattan, Nevada. These forms were found in a ledge on the north side of Iowa Canyon, Lander County, about six miles from the mouth. The canyon is located about 30 miles northeast of Austin. The ledge which is about four feet thick stands almost vertically and strikes north-south. The country rock is chiefly diorite.

Radiating Quartz. The nodular forms of radiating quartz were of different types. Some are almost perfect spheres from 1/4″ up to 2″ in diameter with pyramidal terminations protruding from the surface of the sphere. The specimen pictured in figure 1, shows a nucleus of dioritic country rock from which minute prisms of quartz radiate. Four distinct nuclei are present and prisms of quartz radiate from each of these but maintain a common length of half an inch. The spheres arranged around each nucleus are usually tangent to each other although in some specimens a gap of almost a quarter of an inch was noted. Pyramidal terminations of quartz are quite noticeable in these small pits or cavities. Where the diorite is present as the nucleas material the prisms are stained with iron. Green octahedral fluorite over an inch in diameter forms the nucleus in one specimen. The difference in nuclear material has no effect on the radiating structure.

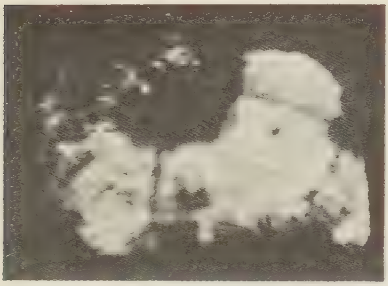


Fig. 1.
Nodular forms of radiating quartz.

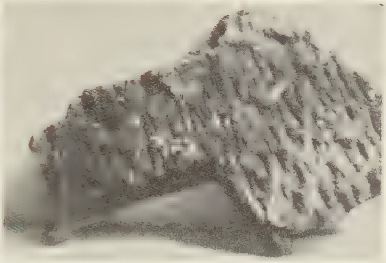


Fig. 2.
Solution cavities and grooves in agate.

The quartz showing this peculiar radiating form is evidently of primary origin as there is no evidence in the field or microscopic study of any other mineral which might be held accountable for the radiating form.

Solution Cavities in Agate. In a nearby locality Mr. Clinton has found massive agate which occurs in veins instead of in nodules or lenses, the veins averaging from 1/4″ to 4″ in thickness. Deep solution cavities which may reach a depth of 1/2 inch are present on one or both sides of the agate. Octahedral fluorite is commonly found associated with this pitted form of quartz. Figure 2 shows one of these pitted specimens.

The trend of the grooves is quite uniform and parallel. The pits are probably due to the presence of a more soluble mineral and as fluorite is a rather common associate of the quartz and the pittings are more or less octahedral in their outline, one might suggest that the fluorite was originally present as a coating on the agate and has now been partially or completely dissolved.

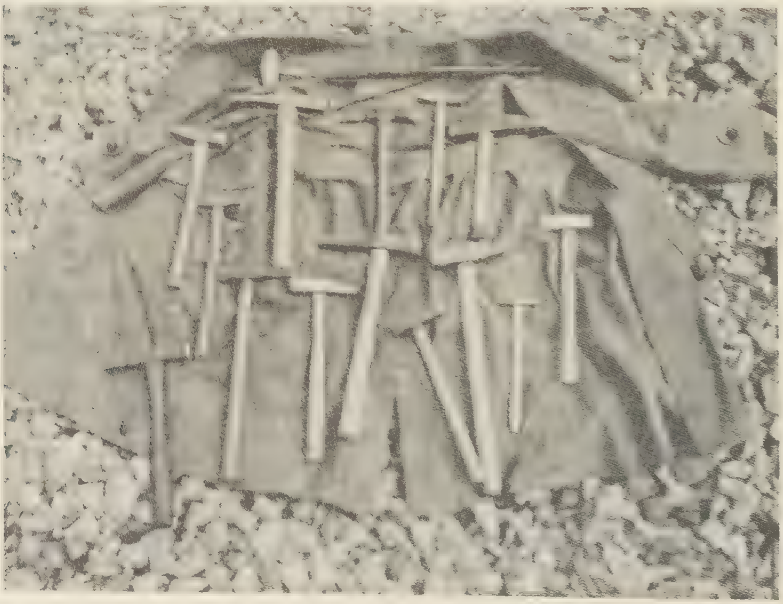
MILKY QUARTZ CRYSTALS. An interesting occurrence of milky quartz crystals in parallel growths and negative crystals is seen in the same locality. These crystals reach a diameter of six inches and show well-developed pyramid and prism faces. The largest crystals develop caps or hoods over the previously formed crystals with thin clayey layers intervening. A cross-section thru three crystals thus developed would resemble three penetrating inverted V's causing each of the capping crystals to show a negative form on the lower side.

The above is evidently a case of interrupted growth. The clayey material separating the crystals seems always to locate at a definite point regardless of whether the crystals are 2″, 3″, 4″ or 6″ in diameter. It is probable that the quartz solutions penetrated a thin clayey seam, or series of seams definitely spaced, the clay acting as a colloidal medium allowing a slow diffusion of the solution through it and permitting the growth of the crystal to continue.

GEOLOGICAL HAMMERS

T. L. WALKER, *University of Toronto.*

Mineralogists and geologists are, as a rule, very critical in regard to their selection of a geological hammer. Every one has exactly the type of hammer he thinks most useful for his purpose. With a view of crystallizing this opinion, in 1922, when on an excursion of the Belgian Geological Congress in the Ardennes, all the hammers of the party were placed on exhibition and photographed. As so many different types were represented it seemed of sufficient interest to reproduce this photograph in THE AMERICAN MINERALOGIST.



The hammer at the top of the series is not essentially geological, but was the property of an old man, a stone breaker by the roadside, who was engaged in breaking stone for road metal. It was on one of his piles of stone that the photograph was taken.

The writer has just received word that Mr. George Stanton of Franklin, New Jersey, has passed away as a result of an operation at the Franklin Hospital. All mineral collectors who have an interest in Franklin minerals will regret the death of Mr. Stanton. He was a most enthusiastic collector and had done much to bring to light some of the interesting and new species that have been described from there in recent years. As one of the underground shift-bosses, he had opportunity to see minerals in the mine and was in close cooperation with the chemists of the company to whom he brought his rare specimens for identification. The study of the distribution in the Franklin mine of minerals carrying arsenic, lead, and chlorine has become of vital importance to the satisfactory purification of the ore. The minerals in which these elements occur were unknown and a careful search checked by frequent chemical analyses was made to locate them. In this way not only was the lead content of hardystonite established but the nature of several recently described minerals such as chlorophoenicite and cahnite was determined. It was Mr. Stanton who discovered both of the last minerals in the mine. His death will not only be a great loss to the chemical work which the staff is thus doing but also to mineralogists since specimens of many of these rare Franklin species were chiefly collected by Mr. Stanton's care.

CHARLES PALACHE

According to Dr. W. W. Coblentz of the U. S. Bureau of Standards the mineral molybdenite may replace the fragile photoelectric cell for certain scientific work. Molybdenite possesses the property of converting light energy falling upon it into electrical energy. When a properly selected crystal is illuminated a current is produced. By using vacuum tube amplifiers the current may be magnified and the crystal serve as a delicate detector of light.

The following corrections should be made in the memorial of Joseph P. Wintringham as published in the March issue (page 70) of THE AMERICAN MINERALOGIST. Mr. Wintringham died on July 17, 1925 (not 1926). He was elected Fellow of The Mineralogical Society of America, in December 1924.

On invitation of the Departments of Geology and Mineralogy of Western Reserve University and Case School of Applied Science, the next annual meeting of The Mineralogical Society of America will be held at Cleveland, Ohio, in conjunction with that of the Geological Society of America and other affiliated societies. The sessions will start Thursday and continue to Saturday, December 29-31, 1927.

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB

Regular Monthly Meeting of January 19, 1927.

A regular monthly meeting of the New York Mineralogical Club was held in the East Assembly Room of the American Museum of Natural History on the evening of January 19, at 8:15 P. M. The President, Dr. Paul F. Kerr, presided and there was an attendance of 39 members.

The Committee on Membership reported favorably on Mr. William E. Belanski, whose name was submitted to the Committee at the December meeting. He was duly elected to membership. The name of Mr. W. H. Southwick, of the American Museum of Natural History was submitted to the Committee on Membership. Mr. Stanton read a letter from Professor E. S. Dana appealing for subscriptions for the relief of the eminent Austrian mineralogist, Dr. G. Tschermak, who together with his wife and the widow of Dr. Friedrich Berwerth are suffering extreme financial stringency as the result of post war conditions. It was moved by the Secretary that the Treasurer be authorized to subscribe $25.00 from the Club's funds for the relief of these scientists and their dependents. The motion was unanimously carried.

The President announced with regret that Mr. Staver, who had been announced as the speaker of the evening, had been suddenly called away and that as substitute speakers Mr. Whitlock and himself would each discuss the mineral localities of a certain area. Dr. Kerr opened this program with a highly interesting description of the California mineral localities in the neighborhood of San Francisco. He emphasized the localities to the south of San Francisco Bay including Pala and Crestmore; the latter he characterized as the Franklin Furnace of California. He touched on the mineralogical interest of the Franciscan formation of the Jurassic which contains glaucophane. Among the rarer minerals of this formation, lawsonite is found to the north of San Francisco. The speaker described the benitoite locality in the town of Hollister and outlined some of the history of the discovery of benitoite. The locality is now exhausted.

Mr. Whitlock spoke on some of the mineral localities of northeastern New York, particularly those of the west shore of Lake Champlain. Among these he described the unfamiliar pegmatite locality for large beryls at Batchellerville, told of the relocating of the chrysoberyl locality to the north of Saratoga, known as "Greenfield" and of a hitherto unrecorded locality for large black tourmaline at Fort Ann. Further to the north, the speaker touched upon a number of graphite mines and prospects all on the granite-limestone contacts and of one of which at Buck Mountain Pond, he expressed the opinion that it had not been visited by mineralogists other than himself. All of these are good collecting fields for the granite-limestone contact minerals. He described the location of the Old Roe Spar Bed on Towner Pond, the locality which furnished the remarkable "skeleton" crystals of tourmaline, and told of a zircon locality near the lake shore just south of Crown Point. Coming to the more important and better known localities he described the magnetite mine localities of Mineville and Lyon Mountain. In discussing the latter the speaker explained in detail the two very obvious generations of minerals and showed how they were related.

HERBERT P. WHITLOCK, *Secretary*

Regular Monthly Meeting of February 16, 1927.

A regular monthly meeting of the New York Mineralogical Club was held in the East Assembly Room of the American Museum of Natural History on the evening of February 16, at 8:15 P. M. The paper of the evening was delivered by Dr. J. F. Schairer, who spoke on "*Some Interesting Mineral Localities in Connecticut.*"

In introducing his subject, Dr. Schairer emphasized the quality and variety of mineral specimens still to be collected from the Connecticut quarries. He divided these localities into six circuits or trips, which could be conveniently made by automobile.

TRIP 1. NewYork, Norwalk, Branchville, Danbury, Brookfield, New Milford, Boardman's Bridge, Gaylordsville, Cornwall Bridge (Graphite Mine), Fall Village (U. S. Gypsum Co.'s quarry), the Canaan quarries, Ore Hill and Salisbury. TRIP 2. New York, Bridgeport, Long Hill, Monroe (Booth bismuth Mine), East Village. TRIP 3. New Haven, Cheshire, Bristol and Barkhamsted. TRIP 4. New Haven, Guilford, Hungry Hill (iolite locality), the Middletown localities. TRIP 5. Saybrook, Chester, East Haddam, Salem, Norwich (Yantic Falls), New London (Flat Rock quarry). TRIP 6. Roxbury (iron mine, gneiss quarry at foot of Mine Hill) and Roxbury Falls.

Throughout Dr. Schairer described these localities in great detail, both as to their exact location and as to the species to be found at each, and illustrated his talk with many specimens which he took pains to point out were average and not specially selected. At the close of his address a vote of thanks was tendered to the speaker for his most interesting and valuable contribution.

HERBERT P. WHITLOCK, *Secretary*

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences of Philadelphia, Feb. 3, 1927.

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the president, Mr. Vaux, in the chair. Twenty-three members and four visitors were present. Mr. R. Eugene Miller of Lancaster, Pa., was elected to membership.

Mr. Oldach addressed the society on the "*Ancient Lead and Silver Mines of Laurion, Greece.*" A history of the mining operations in this region was given. The speaker also described in detail the way in which shafts were sunk and the methods employed for tunneling, drifting and removal of the ore. The manner of administrating the mines by the Athenians and the conditions under which the slaves were forced to work were also described. The mineralogy of the ore deposit and slags was discussed.

Mr. Bierbaum described a mineral collection which he had recently seen in New Jersey, noted for its fine Great Notch and Paterson zeolites. Montreal, Quebec and Ottawa were described from the standpoint of a visiting mineralogist by Mr. Hoadley.

F. A. CAJORI, *Secretary*

Academy of Natural Sciences of Philadelphia, March 3, 1927.

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the president, Mr. Vaux, in the chair. Twenty-three members and six visitors were present.

Dr. W. F. Foshag of the U. S. National Museum addressed the society on "*Some mineral localities of northern Mexico.*" After a description of the geology and mode of occurrence of the ore bodies in the plateau region of northern Mexico, the speaker described the mineral localities and mines which he visited during a recent trip to this region. Of particular interest are the mines at Los Lamentos, yielding lead minerals; the Potosi mine; Place de Guadalupe where native gold in pitchblende occurs; the gypsum caves at Naica in which are clusters of huge selenite crystals, some four to six feet long; Sierra Mojada; Ojuela; the Velardeña region and the Durango iron mountain, Sierra Mercado.

The address was profusely illustrated with lantern slides of the regions discussed. The speaker exhibited specimens of gypsum, wulfenite, pyromorphite, willemite, spurrite, hillebrandite and calcite.

Dr. Foshag was tendered a rising vote of thanks for his very interesting address.

Mr. Cienkowski reported on a trip to the Wood's chrome mine. Dr. Egee exhibited a Manebach twin of amazon stone and Mr. Boyle a specimen of euxenite-polycrase from Mattawan township, Ontario.

F. A. Cajori, *Secretary*

BOOK REVIEWS

SUPPLEMENT TO AN INTRODUCTION TO SEDIMENTARY PETROGRAPHY. Henry B. Milner. 156 pages, 12 plates. Thomas Murby & Co., 1, Fleet Lane, E. C. 4, *London*, 1926; D. Van Nostrand Co., 8 Warren St., *New York*.

Since the publication of the original text in 1922 (review in *Am. Mineral.*, vol. 8, p. 75) a considerable amount of new material has been collected which is now made available to students of petroleum geology thru the present supplement of 156 pages. This supplement includes further instructions in the methods of treatment and analysis of sediments. The properties of 20 additional detrital minerals are recorded and 28 species are represented by figures; making a total of over 50 minerals illustrated in the text and supplement, while 74 species are described. (Under normal conditions 25 are considered a fair average of mineral species occurring in sediments.)

In order to explain more clearly the technique involved 12 examples are given of correlation and differentiation by petrographic methods. The materials selected, including both subsurface and surface stratigraphical correlations, were taken from sands of southern California, Texas, Oklahoma, Rumania, Galicia and from the Cretaceous and Tertiary rocks of England. The concluding pages are devoted to 9 detrital mineral determination tables and a bibliography of over 100 references to the literature published during the period 1922 to 1926.

The descriptions, as in the earlier text, are brief and to the point while the illustrations are of unusual merit. The bibliography is very complete and should be of great assistance to those seeking further information. The supplement no doubt will receive the same favorable reception accorded the original text. It is to be hoped, however, that in the near future the combined subject matter of both text and supplement, properly coordinated, will be published in a *single* work of reference.

W. F. H.

A GUIDE TO THE COLLECTION OF METEORITES. G. T. Prior. Printed by order of the Trustees of The British Museum and sold at The British Museum, Cromwell Road, S. W. 7, *London*, 1926. Price sixpence.

This forty page guide to the collection of meteorites in The British Museum has been prepared to replace Sir Lazarus Fletcher's "Introduction to the Study of Meteorites," the last edition of which was issued in 1914. Much of the original text has been retained but condensed and new material concerning methods of classification and the mutual relations of meteorites has been added.

A brief description of the composition and structure of meteorites is included and the interesting rule noted that "the richer in nickel is the nickel-iron, the richer in ferrous oxide are the magnesian silicates," suggestive of a derivation of the meteorites from a common magma by progressive oxidation. The list of meteorites exhibited in the Museum is given alphabetically and represents 680 falls.

W. F. H.

UEBER DIE SYNTHESE DER FELDSPATVERTRETER. (THE SYNTHESIS OF THE FELDSPATHOIDS). W. EITEL. Preisschriften gekrönt und herausgeigeben von der Fürstlich Jablonowskischen Gesellschaft zu Leipzig. LII. vii+258 pp.+50 Figs. 4 plates. Akademische Verlagsgesellschaft m. b. H., *Leipzig*, 1925, 25 Marks.

This comprehensive work from Dr. Eitel's pen includes both the simpler and the more complex related minerals of the feldspathoid group. The book is divided into three main parts. The first deals with the older qualitative attempts at syntheses of various feldspathoids. Some of the simpler ones considered are leucite, kaliophilite, nephelite, carnegieite, gehlenite, and melilite. The more complex menerals include sodalite, noselite and haüyne, cancrinite, davyne, and scapolite. The second part discusses the modern physical-chemical methods of investigation and reviews first the equilibrium relations of the various three and four component systems of K_2O, Na_2O, CaO, and MgO, with Al_2O_3 and SiO_2, in which feldspathoid minerals have been developed. This is followed by a section devoted to the correlation of experimental results with natural paragenesis, such, for example, as the incongruent melting of orthoclase and the formation of leucite rocks. In a similar manner, the nephelite, melilite, sodalite-cancrinite, and scapolite rocks are also considered. The third part takes up new syntheses in the system Na_2CO_3–$CaCO_3$–nephelite-anorthite, many of them being carried out under controlled pressures. Details of the methods and apparatus are given.

Complete references are cited throughout the text and a full index is given at the end of the book, including authors, mineral names, systems, and localities. Line drawings and plates are freely used. It is a very thorough compilation and should prove of value to anyone interested in this type of synthesis. The large number of references to the results of American investigators is a tribute to those who have been active in this field.

ALBERT B. PECK

NEW MINERAL NAMES

Pseudowavellite

H. Laubmann: in F. Henrich, *Ber. deutsch. Ch. Ges.*, **55**, (Abt. B) p. 3016, 1922; *Geognostische Jahreshefte, München*, **35**, 203, 1922.

Name: From its resemblance to wavellite.

Chemical Composition: Analysis: Al_2O_3 28:18, $(Yt., Er)_2O_3$ 1.02, Fe_2O_3 5.79, CaO 16.86, BaO 0.67, P_2O_5 30.10, H_2O 18.76; Sum 101.38

Physical Properties: White stalactites, triangular in cross section, with perfect basal cleavage.

Optical Properties: Optically+, uniaxial, birefringence 0.015, indices of refraction about 1.63.

Occurrence: As white radiating incrustations on limonite and wavellite from Amberg.

Discussion: Needs further study before accepting as a new species.

J. F. Schairer

Alkali-Spinel

H. von Eckermann: Alkali-spinel of the Mansjö Mts. *Geol. Fören, Förh.*, **44**, 757, (1922).

Name: From the composition.

Chemical Properties: Black octahedrons contained Na_2O 1.38% and K_2O 1.31%. Analysis: MgO 24.76, FeO 9.62, CaO 0.84, Na_2O 1.38, K_2O 1.31, Fe_2O_3 3.04, Al_2O_3 57.80, SiO_2 0.94; Sum 99.69.

Crystallographic Properties: Sharp octahedrons.

Physical Properties: Color blackish green. Sp. Gr. (15°) 3.683. $n=1.720$.

Occurrence: Among the contact-minerals in the Mansjö Mt. limestone in the province of Hälsingland, Northern Sweden.

J. F. S.

Avogadrite

Ferruccio Zambonini: Sulla presenza, tra i prodotti dell' attuale attivita del Vesuvio, di una varietá cesifera del fluoborato di potassio, (On the presence, among the products of Vesuvius, of a caesium-bearing variety of potassium fluoborate), *Rend. Accad. Lincei*, Ser. 6, **III**, 644–649(1926).

Name: In honor of Amedo *Avogadro*, famous Italian chemist.

Chemical Properties: A fluoborate of potassium carrying some caesium, $(K, Cs)BF_4$. Spectroscopic analysis gave K, Cs, B. Chemical analysis deduced from its similarity to the artificial salt. Somewhat soluble in water.

Crystallographic Properties: Tabular crystals of eight sides having an angle of 77°. Artificial salt is orthorhombic, $a:b:c=0.7898:1:1.2830$ $(m:m=76°39')$.

Physical and Optical Properties: Biaxial, negative (?), n is less than that of water. Birefringence very weak. For the artificial salt $\alpha_{Na}=1.3239$, $\beta_{Na}=1.3245$, $\gamma_{Na}=1.3247$. $2E$ large. Plane of the optic axes parallel to $a(010)$, $a=Z$, $b=Y$, $c=X$. Sp. Gr. (pure compound) 2.505.

Occurrence: Found as a sublimate at Vesuvius mixed with other salts.

W. F. Foshag